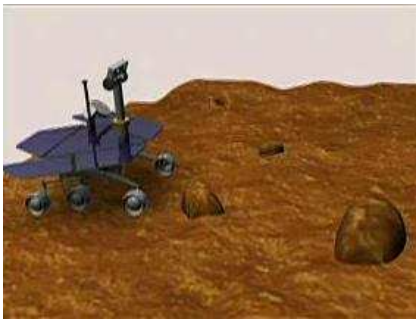
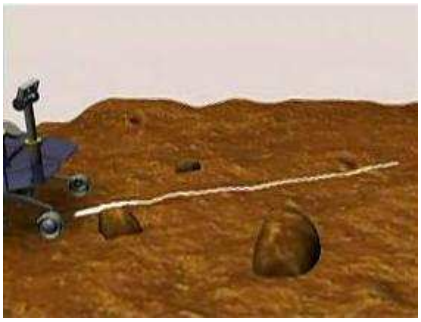
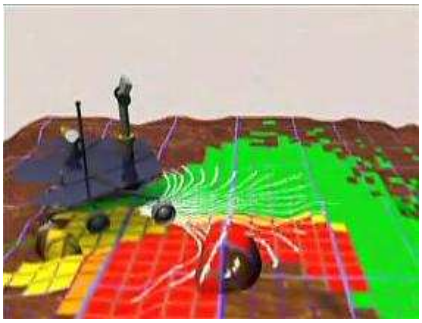
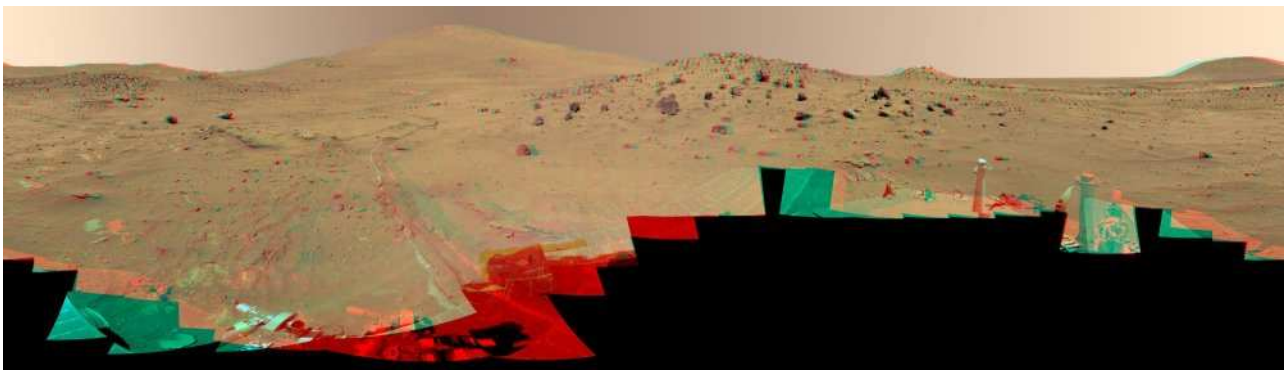
ICE: CHAIN RULE **Math21a**

On October 26, the mars rover Spirit has reached an important mile stone and reached the 1'000'th martian day on the surface. Despite having one cripled wheel, the rover goes strong. The Mars surface has the height $f(x, y) = x + (2x^2 + 3y^2 - xy)$. The rover moves along the path $\vec{r}(t) = \langle (1 + t), \sin(t) \rangle$.

Find the rate of change of the height $\frac{d}{dt} f(\vec{r}(t))$ at the point $t = 0$ by differentiating the function $t \mapsto f(\vec{r}(t))$.

Find the rate of change of the height $\frac{d}{dt} f(\vec{r}(t))$ at the point $t = 0$ using the chain rule.



This 360-degree view, called the "McMurdo" panorama, comes from the panoramic camera (Pancam) on NASA's Mars Exploration Rover Spirit. From April through October 2006. Source: marsrovers.nasa.gov